

App. No. 10/692,165
Amendment dated 02/17/2005
Reply to Office Action of 10/18/2004

Amendments to the Drawings

Please cancel entirely current Figures 16 and 17 from the application. A marked-up copy of the drawing sheets for Figures 16 and 17, including annotations showing that the drawings have been cancelled, is attached in the Appendix.

Remarks

1. INTRODUCTION

Applicants have amended claims 1, 8, and 14, and have added new claims 21-24. Accordingly, claims 1-24 are presently pending in this application. Applicants respectfully request further examination and reconsideration of the application in view of the foregoing amendments and the following remarks.

2. AMENDMENTS TO THE CLAIMS AND SPECIFICATION

Independent claims 1 and 14 are being amended at this time to make them more clearly and patentably distinguishable over the cited United States patents, as explained more fully hereinafter. Claim 8 has been amended so that it is no longer directed to the embodiments shown in original Figures 16 and 17 where the elongate central portions of adjacent plate pairs are spaced from each other. Independent claim 1 has now been amended in a manner which does not include the heat exchangers of Figures 16 and 17. New dependent claims 21 to 24 are being added to the application at this time in order to provide increased and improved protection for the invention of this application. In particular, these new claims, which contain no new subject matter, are directed to features which further distinguish the claimed cooler and snowmobile from the prior art relied upon by the Examiner in applicant's submission.

With respect to the amendments to the description, the summary of one aspect of the invention in paragraph 4 has been amended so that the wording of this paragraph corresponds closely to amended claim 1 of the application. Similarly, paragraph 5 has been amended so that this summary corresponds closely to amended independent claim 14. As more fully explained below, none of these amendments to the specification add new matter to the application and they are fully supported by the specification as originally filed and the drawings. Original paragraphs 23 and 24 are simply being cancelled in view of the cancellation of Figures 16 and 17 from the application. Paragraph 31 is being amended in order to delete the passage that relates to cancelled Figures 16 and 17.

Paragraph 33 is simply being amended to delete the reference number 72 which does not appear in the drawings. Figures 7 and 8 of the drawings instead use the reference number 74 to identify both plates of the plate pair. Only a minor typographical error has been corrected in paragraph 34.

Turning now to the amendments which have been made to independent claim 1 of the application, it will be seen that claim 1 now requires that the plate pairs include two end plate pairs and intermediate plate pairs arranged between the end plate pairs. Furthermore, each end plate pair must abut on one side thereof with a respective one of the intermediate plate pairs. In addition, the elongate central portion of the first plate of each intermediate plate pair abuts the elongate central portion of the second plate of an adjacent one of the plate pairs. This arrangement of the plate pairs is, for example, illustrated in Figures 1 and 2 of the drawings wherein a heat exchanger constructed in accordance with the invention is illustrated. The Examiner is also referred to paragraph 31 as amended which specifically refers to the use of “two end plate pairs 12, and a plurality of intermediate plate pairs 12, all of which are arranged parallel to each other.” In addition, this paragraph states that the end plate pairs each abut on one side thereof with a respective intermediate plate pair. Furthermore, beginning at line 5 of this paragraph, it is specifically stated that for each of the intermediate plate pairs “the planar central portion 38 of the first plate of one plate pair abuts against the planar central portion 42 of the second plate of an adjacent plate pair 12.”

Further support for the amendments to claim 1 and claim 8 can be found in paragraph 28 which describes the plate pairs illustrated in Figures 4 and 5 of the drawings. It is clearly stated in this paragraph that each plate of the pair has “an elongate central planar portion” which is identified by reference 38 in Figure 4. It is clear from Figure 4 that these central portions extend substantially from a first end to a second end of the plate pair as now set out in claim 8. The remaining subject matter now recited in claim 8 is clearly illustrated by Figures 1, 2 and 4 of the drawings, which show that the central portion of the first plate abuts the elongate central portion of the second plate substantially from the first end to the second end.

Since the amendments made to paragraph 4 of the specification correspond very closely to the amendments made to claim 1, it is clear that the amendments to page 4 are also fully supported by the original specification and drawings in this application and that no new matter has been introduced.

Turning now to the amendments to independent claim 14, it will be seen that the features and requirements added to claim 14 are either features that were included in original broad claim 1 or are features corresponding to those now added to claim 1 or included in claim 8 and that are supported by the original specification and drawings as explained above. For example, the features of “first and second plates having elongate central portions surrounded by sealably joined edge portions, said internal passage being formed between said central portions of each plate pair” were included using very similar wording in original claim 1. The remaining added features in the amended claim 14 have either been added to claim 1 or set out in claim 8, these features including the following:

- 1) Two end plate pairs and intermediate plate pairs arranged between the end plate pairs;
- 2) Each end plate pair abutting on one side thereof with a respective one of said intermediate plate pairs;
- 3) The elongate central portion of the first plate of each intermediate plate pair abutting the elongate central portion of the second plate of an adjacent one of the plate pairs substantially from the first end to the second end thereof.

Accordingly, it is submitted that the amendments to claim 14 are allowable for the same reasons as indicated for claims 1 and 8 above and the same applies to the amendments to paragraph 5 of the specification.

With respect to the support in the specification for new dependent claim 21, the Examiner is referred to the description in paragraph 25 which describes the embodiment of Figures 1 and 2. In paragraph 25 it is stated that the heat exchanger “is formed from a plurality of parallel plate pairs 12”. With reference to Figures 4 and 5 of the drawings, paragraph 28 states that each plate in the pair “includes an elongate central planar portion” 38 or 42 and it is clear from Figures 5A

and 5B, for example, that these elongate central portions are parallel to one another. Furthermore, it is clear from Figures 1 and 2 that these elongate central portions are also in substantial contact with the adjacent central portions since they are stacked together. Support for this substantial contact arrangement of the planar central portions can be found in paragraph 31 of the specification as amended.

With respect to support for new dependent claim 22, this claim is directed to a snowmobile that employs the cooler of the invention and a snowmobile is of course illustrated in Figure 3 of the drawings. The Examiner is referred to paragraph 27 which describes Figure 3 and indicates that one or more heat exchangers 10 constructed in accordance with the invention are “mounted between the chassis and drive track 32 of a snowmobile 30”. Furthermore, this paragraph goes on to state that the engine coolant “is cooled by slush, snow, ice and water that is flung from the drive track.”

With respect to new dependent claim 23, this claim is directed to the embodiment illustrated in Figures 13 and 14. Support for the wording used in claim 23 can be found at lines 3 to 5 of paragraph 37. Similarly, with respect to dependent claim 24, support for the wording used in this claim can be found at lines 5 to 8 of paragraph 37.

3. REJECTION OF CLAIMS 1-3 AND 5-11 UNDER 35 U.S.C. § 102(B)

Turning now to the anticipation rejection of claims 1 to 3 and 5 to 11 based on U.S. Patent No. 3,810,509 to Kun, the cited reference is directed to a cross-flow heat exchanger that appears to have been designed for use in an automobile. The heat exchanger includes an outer structural frame and a multiplicity of first fluid channels longitudinally aligned in parallel spaced relation. As clearly illustrated in Figures 1 to 4, each channel 1 can be formed by a pair of elongate plates that form two side walls 2 and edge walls 3. At least one fin 4 extends outwardly from a longitudinal seam formed by the two plates along the length of an edge wall. The fins can be provided with a multiplicity of surface distortions 6 in order to enhance heat transfer.

With particular reference to Figures 15 to 15B in the cited reference, it will be seen that the plate pairs are arranged side-by-side in order to construct this known heat exchanger and, if

each plate pair is provided with a front fin and a rear fin as shown, there can be a series of generally parallel front fins 23, 24 and rear fins 25, 26. Fluid passageways 29 are formed by the two plates of each pair and it will be seen that there is a second set of second fluid passages 30 formed between adjacent plate pairs (or so called heat exchanger channels) 21, 22. The second cooler fluid, for example air, not only passes between the front and rear fins for heat exchange purposes, but also passes through the passages 30, and indeed the existence of the passages 30 appears to be necessary for operation of this heat exchanger as intended.

From this review, it will be seen that amended claim 1 does patentably distinguish over this reference now by the following requirements:

- 1) Each end plate pair abuts on one side thereof with a respective one of said intermediate plate pairs; and
- 2) The elongate central portion of the first plate of each intermediate plate pair abuts the elongate central portion of the second plate of an adjacent one of the plate pairs.

In other words, claim 1 as now amended is directed to a heat exchanger which does not have the passages 30 for air flow that are taught by and used in the heat exchanger of Kun. It should be appreciated by the Examiner that the heat exchanger construction now specified in claim 1 has advantages over the Kun heat exchanger, particularly for the preferred use in a snowmobile. In particular, because the plate pairs abut each other, the plate pairs effectively create a barrier which does not allow either air or such materials as slush, snow and water to pass through the plate pairs. In other words, air and materials such as snow and slush are generally confined to the region between the exposed, elongate fin plates that extend outwardly from the joined edge portions.

It may be desirable for the present heat exchanger to act as a barrier in this manner because, firstly this can save weight since no additional barrier must be provided in the region of the heat exchanger, for example, along a section of the tunnel for the snowmobile track, in order to keep snow, ice and water out of the inside of the snowmobile body. In addition, because the

present heat exchanger may act as its own barrier to snow and ice, this can save valuable space in the tight, tunnel area that accommodates the snowmobile track.

Moreover, it is submitted that there is no teaching or suggestion in Kun which would lead one skilled in the art of heat exchangers to modify the heat exchanger of Kun so as to eliminate the air passages 30 that separate the plate pairs. Accordingly, reconsideration of the rejection of claims 1 to 3 and 5 to 11 on grounds of lack of novelty is respectfully requested.

4. REJECTION OF CLAIMS 4 AND 13 UNDER 35 U.S.C. § 103(A)

With respect to the obviousness rejection of claims 4 and 13, it is respectfully submitted that these claims distinguish over the cited reference in a patentable manner for the same reasons as stated above for claim 1. Moreover, with respect to the subject matter of claim 13, namely the requirement that the fin plates “extend only from one elongate joined edge portion of the plate pairs” it is submitted that this feature is only advantageous in the context of the present heat exchanger wherein there are no air passageways between the plate pairs and the plate pairs act as a barrier. With the type of heat exchanger now required by claim 1, only fin plates located on one side of the heat exchanger could be contacted by fast moving air in the tunnel of a snowmobile and the snow and slush thrown up by the track. There would be little point in having fin plates on both sides of such a heat exchanger since the fin plates on one side of the heat exchanger would be covered by the heat exchanger itself. This is not the case in the Kun construction wherein air passages are formed between the plate pairs so that air flow can reach the front and rear fins located on opposite sides of the heat exchanger. Accordingly, for this reason, it is submitted that dependent claim 13 further distinguishes over the teachings of Kun.

5. REJECTION OF CLAIMS 12, 14, 16-18, AND 20 UNDER 35 U.S.C. § 103(A)

Turning now to the rejection of a number of claims including independent claim 14 on the grounds of obviousness in view of the Kun reference and U.S. Patent No. 6,109,217 to Hedlund et al., it is respectfully submitted that the Hedlund reference does not overcome the aforementioned deficiencies in the teachings of Kun. In particular, Hedlund has simply been cited by the Examiner for its teaching for the use of heat exchangers to cool engine coolant in a snowmobile. In Figure 4, there are shown two side coolers 46 and 50 that extend on opposite

sides of the snowmobile. There is also a rear cooler 48 that extends between the rear ends of the two side coolers. It appears that all of the coolers used in this snowmobile construction, including the two side coolers 46,50 are preferably constructed by extruding aluminium. With respect to the fin plates 60 shown in Figure 6 and used on a preferred form of the side coolers, it appears that these plates or integral panels are used to connect the side cooler to the foot rest of the snowmobile and to place it in thermal contact with the foot rest (see column 4, lines 12 to 24).

It will be seen from this review that the Hedlund reference does not teach the use of stacked plate heat exchangers, the type required by both of independent claims 1 and 14. Thus, the Hedlund reference suffers from the same deficiencies as Kun in that it does not disclose or suggest the following features set forth in claim 14:

- 1) Each end plate pair must abut on one side thereof with a respective one of the intermediate plate pairs;
- 2) The elongate central portion of the first plate of each intermediate plate pair must abut the elongate central portion of the second plate of an adjacent one of the plate pairs; and
- 3) Each plate pair includes a large elongate exposed fin plate portion....for receiving materials flung by a drive track of the snowmobile.

Furthermore, it is submitted that in fact it would not be obvious to use a heat exchanger of the type taught by Kun in the manner taught by Hedlund in order to cool engine coolant of a snow mobile. One significant reason for this is the fact that the Kun heat exchangers specifically require the use of air passages between the plate pairs whereas the use of such passages could be undesirable when the heat exchanger is mounted on a snowmobile in a manner whereby the fin plates receive materials "flung by a drive track of the snow mobile" as required by claim 14. It will be appreciated that if the passageways 30 taught by Kun were used, the flung snow, ice and water could pass through these passageways and become trapped in the body of the snowmobile. Alternatively, the snow and ice flung up by the track can block the passages 30 of Kun preventing the air flow that Kun desires between his plate pairs. For all of the aforementioned

reasons, reconsideration of the obviousness rejection of claims 12, 14 and the claims dependent upon claim 14 is respectfully requested.

6. REJECTION OF CLAIM 15 UNDER 35 U.S.C. § 103(A)

With respect to the rejection of dependent claim 15 which specifies that the mounting bracket means “includes to L-brackets”, it is respectfully submitted that this dependent claim is allowable over the cited combination for the same reasons as claim 14. In other words, the Broadhurst Patent No. 5,025,641 does not in fact overcome the aforementioned deficiency in the teachings of Kun and Hedlund et al. The Broadhurst patent simply teaches an apparatus for making flake ice, this apparatus including a plastic frame and a slidably mounted freezing plate. The apparatus includes ice slides that direct the ice into an ice conveyor. The Broadhurst patent does not employ a stacked plate heat exchanger of the type required by claim 14.

7. REJECTION OF CLAIM 19 UNDER 35 U.S.C. § 103(A)

Finally, with respect to the rejection of dependent claim 19 on the grounds of obviousness in view of the combination of three separate references, it is respectfully submitted that claim 19 does in fact further distinguish over this combination of references and its subject matter would not be obvious to one skilled in this art. With respect to the Nakamura et al. reference, this reference is directed to a special form of cylindrical air-to-air heat exchanger and there is no reason to believe that one skilled in the construction of heat exchangers would look to the teachings of this reference to provide an improved heat exchanger suitable for a snowmobile, for example. The Examiner relies upon the version of a heat exchanger illustrated in Figures 6 to 9 of the drawings of Nakamura. However, as explained in the description beginning at column 5, line 29, the heat exchanger unit 22 is provided in a cylindrical housing 21 and thus is completely enclosed on the longitudinal sides. The heat exchanger 22 and the housing 21 are designed to be mounted on the body of a gas turbine engine (not shown) by flange portion 25. The heat exchanger consists of a plurality of first fins 28A, second fins 28B and partition members 29 which are alternately radially disposed around an inner casing 27. The first and second fins are corrugated and have a width which is gradually enlarged from the inner toward the outer end. As stated at lines 47 to 50 of column 5, the assembly “consisting of these fins 28A, 28B and

partition members 29 is in the form of a thick-walled cylinder.” It is not seen how it would be obvious to one skilled in the construction of heat exchangers for snowmobiles to adopt the teachings of Nakamura in order to provide a cooler for a snowmobile engine coolant. In particular, since the Nakamura heat exchanger is mounted within a thick walled cylinder, clearly this heat exchanger will not have any exposed fin plate portion for “receiving materials flung by a drive track of the snowmobile”. In addition, it is not seen how it would be suitable for mounting in a snowmobile, particularly in a tunnel that accommodates a snowmobile track. The cylindrical construction of the Nakamura et al. heat exchanger appears to require space that is simply not available in the tight space environment of a snowmobile track tunnel.

Moreover, it is submitted that it would be contrary to the teachings of Nakamura et al. to construct a cooler for a snowmobile wherein the cooler is only a stack arcuately bent about an axis and is not a complete cylindrical apparatus mounted in a cylindrical housing.

8. NEW CLAIMS 21-24

Turning now to the new claims which are being added, claim 21 is simply directed to a preferred form of the cooler recited in claim 14. In other words, claim 21 is directed to the preferred embodiment of the cooler illustrated in Figures 1 and 2 wherein the elongate central portions of the plates of each pair are parallel to one another. This arrangement results in a substantial contact area between adjacent back-to-back plates.

Claim 22, which is dependent upon claim 14, is directed to a complete snowmobile that incorporates the cooler of claim 14. This claim further distinguishes over the Kun reference when considered alone as the Kun reference is not directed to heat exchangers designed for use on snowmobiles, particularly coolers wherein engine coolant is cooled by material flung from the drive track.

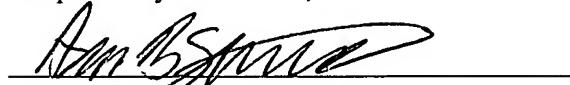
New claim 23 has been added in order to have a further, more restricted claim directed to the embodiment of Figures 13 and 14. The same comment applies with respect to new claim 24.

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9. CONCLUSION

It is respectfully submitted that all of the claims that remain in this application are in condition for allowance and such action is earnestly solicited.

Respectfully submitted,



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APPENDIX

